

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 1467

PERFORMANCE REQUIREMENTS
FOR GENERAL PURPOSE PUSH-PULL
SINGLE-POLE CIRCUIT-BREAKERS FOR AIRCRAFT

1st EDITION
October 1970

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Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 1467, *Performance requirements for general purpose push-pull single-pole circuit-breakers for aircraft*, was drawn up by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1467, which was circulated to all the ISO Member Bodies for enquiry in March 1968. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Italy	Thailand
Belgium	Netherlands	Turkey
Brazil	New Zealand	U.A.R.
Canada	Poland	United Kingdom
Czechoslovakia	Portugal	U.S.S.R.
France	South Africa, Rep. of	Yugoslavia
India	Spain	
Israel	Switzerland	

No Member Body opposed the approval of the Draft.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

PERFORMANCE REQUIREMENTS FOR GENERAL PURPOSE PUSH-PULL SINGLE-POLE CIRCUIT-BREAKERS FOR AIRCRAFT

1. SCOPE

This ISO Recommendation states the performance requirements for push-pull, trip-free circuit-breakers having an inverse time/current characteristic, of normal ratings up to and including 35 A, for use in nominal 28 V d.c. and/or 115 V single-phase 400 Hz a.c. line to neutral circuits.

NOTE. — It is not envisaged that single-phase circuit-breakers will be required for 200 V a.c. line to line circuits. Tests outside the scope of this ISO Recommendation will be necessary if the circuit-breaker is required in such applications.

2. DEFINITIONS

- 2.1 *Push-pull circuit-breaker.* A circuit-breaker with a single button to trip and reset the breaker, by pushing to make and pulling to break.
- 2.2 *Trip-free circuit-breaker.* A circuit-breaker so designed that holding the push button in the closed position will not override the tripping mechanism and will not permit subsequent closure of the contacts until the push button has been returned to the open position and the tripping mechanism has reset.

3. DESIGN REQUIREMENTS

- 3.1 The circuit-breaker should be suitable for use at ambient temperatures from -40 to $+55$ °C and at altitudes up to 18 300 m.
- 3.2 The circuit-breaker should be operated by a single button, pushed to make and pulled to break the circuit, the button being perpendicular to the plane of the mounting panel. The portion of the button visible when the circuit-breaker is in the closed position should be black. A white band on the button should be exposed when the circuit-breaker is in the open position.
- 3.3 The circuit-breaker should be suitable for through-panel mounting, preferably by single-hole fixing, and should operate satisfactorily when mounted in any attitude.
- 3.4 The circuit-breaker should be trip-free, and should incorporate an automatic over-current tripping device.
- 3.5 At the values of current stated in section 8, the circuit-breaker contacts should open automatically within the time limits stated and the manual operating device should move to the open or off position.
- 3.6 The circuit-breaker should be so designed that, after tripping on overload, it cannot reclose automatically.

4. DIMENSIONS

The envelope and fixing dimensions for the circuit-breakers should comply with ISO Recommendation R 530, *Dimensions for general purpose push-pull single-pole circuit-breakers for aircraft*.

5. CONSTRUCTION

- 5.1 The push button should be insulated from all current-carrying parts, and should not remain in an intermediate position, or give a false indication.
- 5.2 The circuit-breaker should be so constructed that the forces required to operate it manually do not exceed the following values :

Closing force	Tripping force
N	N
55	40

It is envisaged that in any particular design of circuit-breaker the actual value will be controlled to close limits.

- 5.3 The portion of the circuit breaker visible when mounted should have a non-glaring finish.
- 5.4 The circuit-breaker should be so constructed that tampering with the calibration is not possible without dismantling the device or breaking a seal.
- 5.5 Each terminal screw or stud should be size No. 6 UNC, or M4 × 0.7 and each should be capable of accepting two tag-type terminations.
- 5.6 The circuit-breaker should be mounted by means of a threaded bush suitable for use with the panel mounting hole specified in ISO Recommendation R 530. Two hexagon mounting nuts, one locating washer and one internal shakeproof washer should be provided with each circuit-breaker.

6. VOLTAGE AND CURRENT RATINGS

6.1 Voltage

The circuit-breaker should be suitable for operation in a nominal 28 V d.c. and/or 115 V single-phase 400 Hz a.c. supply (line to neutral circuit in a 200 V three-phase, 400 Hz a.c. system) having the characteristics described in ISO Recommendation R 1540, *Characteristics of aircraft electrical power systems*.*

6.2 Current ratings

The preferred normal current ratings of the circuit-breakers are listed in Table 1.

TABLE 1 — Normal current ratings

A	A
1	10
2	15
3	20
5	25
7.5	35

* At present Draft ISO Recommendation.

7. ENVIRONMENT

The circuit-breakers should comply with the requirements of ISO Recommendation R . . .,* *Environmental and operational conditions of aircraft equipment*, including vibration, acceleration, crash-landing, climatic, explosion proofness and magnetic influence. They should not support mould growth and should not deteriorate even after storage for long periods in the tropics.

8. TIME/CURRENT CHARACTERISTICS

The time/current characteristics of each circuit-breaker should be within the limits shown in Table 2, which represent envelope characteristics to cover all manufacture. It is expected that the limits for circuit-breakers of an individual manufacturer would conform to closer tolerances.

TABLE 2 – Limits for time/current characteristics

Circuit-breaker normal current rating (per line)	Ambient temperature	Tripping current	Tripping time
A	°C	% normal current	s
1 to 35	20 ± 2	200	12 to 60
		400	2 to 7.5
		600	1 to 3.5
		1000	0.35 to 1.2
1 to 5	– 40 ± 2	200	70 to 350
		400	5 to 15
		600	2 to 6
		1000	0.7 to 2
7.5 to 35	– 40 ± 2	200	27 to 200
		400	3.5 to 12
		600	1.5 to 5
		1000	0.5 to 1.75
1 to 35	55 ± 2	200	8 to 45
		400	0.8 to 7
		600	0.6 to 3
		1000	0.2 to 1

9. MAKING AND BREAKING CAPACITY

The circuit-breaker should have a making and breaking capacity appropriate to the relevant categories shown in Tables 3 and 4, when tested under the conditions described in clause 12.15.

TABLE 3 – d.c. categories

Rupturing capacity category	Calibrated test current (A) (prospective current)			
1.5 D	—	—	1500	1000
3 D	—	3000	1500	1000
6 D	6000	3000	1500	1000

* To be prepared.